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ABSTRACT

This report outlines success factors and challenges identified in a study of the educational electronic communications networks in three selected Southern Regional Education Board (SREB) member states (i.e., Florida, Georgia, and Oklahoma) and through discussions of the SREB's Educational Technology Cooperative. The report is organized in sections that address: participation and support; educational leadership; technology strategies; funding; special pricing and discounts for education; methods of charging users; economies of scale; organization; planning; user issues; costs of procured telecommunications services; services to private business; effects on economic development; and growth of network use. Each section summarizes the important policy and management considerations raised by the state networks and presents questions that should help other states establish or review plans to develop or improve an educational network. (AEF)

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Statewide Educational Networks: Policy and Management Report

Electronic communications networks are gaining a lot of attention and are changing our society and economy. They are playing an essential role in improving and expanding access to education. States for years have used some forms of educational networks, such as educational TV and access to shared computers. However, the development of the Internet and the current revolution in telecommunications technology and services have brought tremendous potential for new and improved educational services. Virtually all states' education agencies are involved in complex, challenging projects addressing this potential.

A state's success in developing or in expanding and improving a statewide educational network depends on informed planning and management. This report outlines success factors as well as challenges identified in a study of the educational networks in three selected SREB member states[1] and through discussions of the SREB's Educational Technology Cooperative. Each section below summarizes the important policy and management considerations raised by the state networks and presents questions that should help other states establish or review plans to develop or improve an educational network.

Participation and support

A statewide educational network's success depends largely on the level, type and scope of sponsorship and participation in developing and managing it. All three states studied had high-level, relatively open, broad participation.

Top-level support in both the education agency and the state government is essential for several reasons:

- It is important to obtain and sustain the commitment and participation of educational entities; state telecommunications agencies and possibly other state agencies; and vendors.
- Significant funding is needed for initial development and for ongoing support.

[1] In 1998 the SREB Educational Technology Cooperative developed a report, *An Educational Network Study in Three SREB States — Success Factors and Issues,* based upon reviews of statewide educational networks in Florida, Georgia and Oklahoma and funded by SEIR*TEC. Copies of this detailed report may be obtained from the SREB.

- Strong, visible support at the top level facilitates changes that are needed for a network to be successful. For example, new organizations must be put in place, new technologies must be bought and used, and new applications must be developed and promoted.

For the same reasons, success relies on broad involvement in an open, participatory planning and management process. All affected parties will need ongoing communications about the project in order to ensure that their needs are met, to prepare for necessary changes in their programs, and to commit funds and other required resources. Affected parties include education agencies, colleges and universities, schools, the state telecommunications agency, and vendors.

Although all education agencies should be involved in the overall plan and commitment, the level of active participation may vary because of factors such as agency funding and preparedness to participate in the project.

None of the three states in the study installed a telecommunications transmission facility owned fully by the state, but Oklahoma installed its own fiber in some of its major backbone lines. Statewide networks generally depend largely on communications services provided by vendors - for example, telecommunications services from telephone companies. Special provisions must be made for private-sector participation in planning, installing and operating the network. The manner and timing of vendor participation depends upon state laws and regulations. If needed, formal requests for information or third-party consultants should be included early in the discussion and planning.

Questions to ask

- Are the state education agencies sponsoring the project and is it a top priority?
- Have other state agencies, such as state telecommunications and purchasing, pledged their commitment and cooperation?
- Have the education agencies anticipated funding and organizational changes that may be required?
- Has a planning process been developed that will be open and participatory, so that all affected parties will feel ownership?
- Has there been a realistic and systematic assessment of the state's telecommunications market and infrastructure, involving extensive participation by vendors?

Educational leadership

The three state studies confirm that education agencies should take the lead in planning and managing the development of statewide educational networks. Such networks and related services still are not standard commodities and are not obtained easily on the open market. These networks and services must be tailored to meet education users' specific needs and priorities.

Education leaders should require the network facilities and services supplied by vendors and other providers to be responsive to education users' specific needs and priorities. Each education agency must develop or designate organizational responsibility for ensuring that procured or direct services meet its networking needs, even when networking services are obtained

through another state agency, such as telecommunications.

Questions to ask

- Are education agencies in a leadership position to ensure that educational needs and priorities are met and that educational resources are appropriately under their control?
- Has each education agency assigned specific organizational responsibility for educational network services?

Technology strategies

The three states' new telecommunications investments are designated predominantly for new technologies, specifically those dealing with the Internet. These investments are considered most beneficial to education statewide.

Oklahoma believed it was important to consolidate the management of all electronic communications technologies (Internet, TV and video). This strategy made organization and staffing more efficient. It also made some decisions about technology easier. For example, the decision to invest new funds primarily in Internet technologies did not involve separate organizations that might have competed for new funding.

Questions to ask

- Are new investments in educational networking going toward new technologies rather than older technologies that may become outdated or obsolete sooner?
- Are organizational structures for technology management being updated to reflect changing technologies — for example, to eliminate unwarranted specialization and fragmentation?

Funding

It is not surprising that the economics of statewide educational networking is deemed an important success factor. The considerations include revenue sources; methods of charging; initial vs. ongoing costs; special pricing for education; funding sources' responsiveness to changing needs and increased demand; and economies of scale. While the three states' goals and concerns are similar, their approaches and methods vary significantly. Each state's starting point and funding approach were based on its unique situation. Florida's and Oklahoma's networks were initiated by legislative appropriations, while Georgia's was initiated with general funds from the University System.

One-time funds for acquisition and installation of the network typically are easier to obtain than are continuing funds for ongoing support and commitments for upgrade and replacement. One key to success is achieving a balance of types and timing of funds to cover the network's installation and continued operation.

Funding sources need to respond to growth in business and to changes in service requirements, such as new services based on new tech-

nology. A related issue is whether to charge for services or depend on allocations from the education agency or the legislature.

On one hand, allocated funding focuses attention on top-level priorities and reflects executive-level decisions about them. It promotes wide participation and certain activities, such as collaboration, that would be more difficult under a charge system. Allocated funding can be more predictable and avoids the "overhead" of administering a charge system.

On the other hand, funding through charges makes it possible to respond to users' changing needs as soon as they are willing and able to pay for new or expanded services. Also, growth in volume is funded automatically through growth in revenue. When users have internal funds to pay for services, the network does not have to wait for funding approval through the competitive allocation process.

Questions to ask

- Have all current and future costs of the project and ongoing network services been considered? These costs include acquisition, installation, staffing, training, ongoing operation, maintenance, growth, upgrade and replacement.
- Will funding sources be flexible and responsive enough to handle needed growth and change as they occur?
- Will education entities be able to use their funds to acquire network services as needed?
- Even if a charge system is to be used, does the education agency have some specific uses of the network that should be funded through central allocations?

Special pricing and discounts for education

The best pricing and discounts are vital in order to keep costs affordable for all educational entities. All three states obtained some degree of special pricing for education from telecommunications vendors, but the amount and nature of the discounts varied. Special pricing is not automatic or easy to obtain from vendors; it must be included in the initial contracts for services. The state's public service commission and sometimes its telecommunications agency typically are required to collaborate.

Each state must consider carefully the E-rate provisions of the Telecommunications Act of 1996. The E-rate is designed to provide schools and libraries with discounts on Internet access, voice and data services, and infrastructure. Particulars about which schools will be eligible and for what services and levels of discount are not resolved and will change from year to year. How this new program will be integrated into statewide networking remains to be determined.

Questions to ask

- Does the plan provide for obtaining special pricing from vendors — for example, through negotiation or competitive bids?
- Has appropriate support been established — for example, from the public service commission, state telecommunications, and state purchasing?

- Are there provisions to ensure that network services qualify for the FCC's E-rate program? For example, are costs related to K-12 users kept separate?

Methods of charging users

Some networks are funded largely through charges to users. Methods of charging users vary for several reasons, including equity of access, costs of maintaining a charge system, and incentives for participation.

Equity of access often is the major reason an educational network charges all users the same, regardless of differences in cost. Actual costs are averaged to determine a single charge for all users. For example, there may be a single charge for line costs regardless of the distance involved, enabling participation by remote sites that otherwise could not afford the actual cost. As a result, all students have equal access.

It also is important to consider the cost of administering a charge system when determining charging methods. It can be costly and complicated to levy a separate charge for each different service on the basis of the actual cost for each user. Leveling charges reduces the administrative costs. Charging groups of users based upon periodic agreements for specified services also can reduce administrative costs. For example, Georgia charges agencies annually for contracted services, eliminating detailed charges to each school or user group.

Questions to ask

- Is equity of access to network services a major objective of the project? If so, will this be accomplished through equal charges despite variations in specific costs, through allocations, or through some other method?
- Have the requirements of administering a charge system — including staffing, systems and procedures — been considered adequately?

Economies of scale

Economy of scale is probably the most important consideration in the affordability of statewide educational networking. This situation comes from procuring services from the private sector at a reasonable cost and obtaining necessary staff to develop and operate a network. It is not feasible for each school, library, college or university to develop its own state-wide network. Some collaboration and sharing, and the economies of scale that result, are necessary for a comprehensive statewide network to be feasible. However, as this study of networks demonstrated, decisions about economies of scale can be difficult and may vary from state to state.

Oklahoma consolidated all networking and communications technologies for all state agencies under one management structure. This move appears to have achieved significant economies. Because this consolidation is relatively recent, it remains to be seen whether it adversely affects other factors, such as respon-

siveness to each agency's specific needs and priorities, complexity of management, and long-term funding requirements.

Georgia has a consolidated data network for all of education and a second consolidated network for other state agencies; the two share a physical transport backbone as much as is practical. The state apparently believes that this arrangement both achieves sufficient economies of scale and allows for specific, differentiated services to education and state agencies when needed. In addition, separate state agencies operate educational television and interactive-video networks.

Florida's situation is similar to Georgia's, except that the state agency network also offers services directly to educational institutions. These services overlap certain services offered by the educational network.

Questions to ask

- Have specific economies of scale been identified and analyzed in planning for the network?
- Have appropriate procedures and organization structures (for example, consolidation of functions) for achieving the targeted economies of scale been determined?
- What trade-offs are being made to achieve economies of scale? For example, are the benefits of ownership, customization and specialization lost? Has an appropriate balance been struck?

Organization

All three states face significant questions and issues regarding network governance and leadership. These questions result partly from rapid changes in technology, including the overlap and merger of various technologies; the broader scope required by economies of scale; and the strategic importance that education and other state agencies assign to technology. Each of the three states has a different model of governance and leadership that offers unique challenges and issues.

A consolidated model faces the significant challenge of developing governance and management structures capable of meeting constituents' various needs and priorities. For example, education agencies and other state agencies may have different networking priorities regarding security, flexibility, variations in demand, information dissemination and funding. While education agencies' needs and priorities also vary, they have more in common. In addition, education agencies themselves have similar governance structures that, in some states, are related under a common structure. This factor facilitates responsive, effective governance of networks.

A common problem is the lack of effective means of user participation. Agencies using the network must have a voice in the planning, management and decision-making of the network. As an agency becomes more reliant on the network, the management of that agency will need a clear, effective means of influencing the network's direction in order to ensure that it meets the agency's changing needs.

Other aspects of network management also influence the overall governance. For example, if the network operates as a business and sells its services competitively, then users have choice and control, even if they lack strong representation on a governance committee. Balancing regulation and competition is a challenge in designing the governance and management structure.

Both Florida and Georgia faced the significant challenge of developing an appropriate, productive relationship with the state telecommunications agency. Education systems must exercise leadership and control in determining requirements and obtaining services. State telecommunications agencies often retain a philosophy and policy structure developed at least 20 years ago, when the business and technology of telecommunications were very different (i.e., plain telephone service provided by a monopoly). At that time, state telecommunications agencies generally consolidated the state's telephone business to negotiate better rates through economies of scale. The law typically required education and state agencies to obtain telephone services through the telecommunications agency. Little planning and user participation were needed.

However, today's telecommunications industry is characterized by competition, many and varied services, and rapidly changing technologies. Services can and should be designed and selected to match users' specific needs and priorities. While economies of scale still are available, they come in different forms and must be weighed against tailored services that match users' specific needs more closely. Though total consolidation and control of all telecommunications services under a single state agency likely was the best decision in the past, it may not be today.

Further, as networking becomes more prevalent in education and the network increasingly is equated to a classroom facility, it becomes evident that the education system must "own" that resource, whether outright or through a contract. Because state telecommunications agencies typically do not accommodate such ownership by education agencies, the relationships between the agencies often are difficult.

Another issue is "partnering" with businesses in order to accomplish some goals of statewide educational networks. For example, making the network equally accessible to remote areas might call for commitments from vendors and the agency based on shared expectations, shared resources and collaboration. Also, achieving uniform, standardized statewide service requires a consortium of vendors and state agencies. Meeting these requirements under the state's normal purchasing practices can be extremely difficult. Developing a new procedure under existing laws and policies also can be challenging.

Finally, all three states reported difficulties in recruiting, developing and maintaining staff in these new, rapidly changing technologies. The market for technical staff, especially in the new networking technologies, is very intense. State salaries typically cannot compete with the commercial market; staff members often learn the new technologies, gain experience and then leave for a more attractive job elsewhere. Education agencies must pay special attention to this problem. For example, some agencies outsource selected services to private corporations. Others use various means — including special salary adjustments, flexible time policies and professional-development opportunities — to recruit and maintain staff.

Questions to ask

- Has a governance structure been planned that will be responsive to education agencies' specific and changing needs and priorities? Do the education agencies have a clear method of recourse if the network organization is unresponsive?
- Are there clear, routine and effective mechanisms for user participation in network planning and management?
- What is to be the relationship between the network and the state telecommunications agency?
- Do the education agencies have appropriate control of network resources and services through either ownership or contract? Is this control similar to their control of other resources, such as facilities?
- Are there plans to involve vendors in the development and delivery of equitable, standardized, advanced network services statewide?
- Have the availability of technical staff and the requirements for maintaining them been analyzed?
- Do plans for staffing consider training, salaries, special recruitment methods and contracted services?

Planning

All three study states plan budgets and reports at least annually. There also were various ad-hoc plans and studies in selected areas, such as technology upgrades, network expansion, documents related to purchasing, and policy issues. However, there generally was no comprehensive, continuing planning process that involved all users. There also were no ongoing procedures for evaluating network performance and issues. Improved, ongoing planning and evaluation procedures are expected to be a growing concern.

Another significant challenge is maintaining adequate bandwidth to handle the fast growth in Internet use, multimedia and other applications. Education agencies' typical planning procedures have difficulty with such rapid change.

Questions to ask

- Is there a specific method of ongoing network planning that involves all constituencies and is coordinated with the education agencies' normal planning cycles?
- Will planning include ongoing evaluation and accountability procedures?
- Do planning methods meet the challenge of rapidly increasing bandwidth requirements and changing technologies?

User issues

Education agencies have to re-evaluate their restrictive policies on course and program offerings based on geography. In all three states colleges historically have dispersed throughout the state in order to serve students better through proximity. Each college generally considers the geographic area around it to be its domain, and agencies governing higher education typically have honored and "enforced" these "turf" understandings.

The availability of effective, high-capacity, statewide educational networks has raised many questions and issues regarding these "turf" concepts. In order to best serve students under today's conditions, new methods should be considered for delineating roles and relationships among schools and colleges to reflect the geographic and time flexibility of electronic delivery.

Too often users are inadequately prepared for new technology. To have any success in solving educational problems, technology must be used effectively by teachers, support staff and students. Without training programs, skill development, support from a technical staff, and appropriate incentives and rewards, technology cannot be used effectively.

Questions to ask

- Does the project plan address necessary changes in other aspects of the agencies' operations and policies, such as traditional concepts of institutional "turf"?
- Does the project plan address programs for training, skill development, support of a technical staff, and appropriate incentives and rewards?

Costs of procured telecommunications services

The costs of procured telecommunications services are especially important in educational networks' success and should be addressed early in the planning process. Costs are determined by several factors, including relationships with telecommunications agencies and vendors; vendors' pricing and rate structures; educational pricing; subsidies; and the E-rate. States' approaches to these factors vary, and they have varying degrees of success in achieving reasonable and advantageous costs. This area deserves further comparative analysis.

Question to ask

- Does the plan address special pricing or other assistance with costs that may be offered by vendors and/or private and government programs?

Services to private business

Educational networks should have policies that deal with providing access and other services to private interests and businesses. When private interests, such as companies, use the network as constituents of a college's education, research or service programs, they typically

operate under the same policies applied to their use of other resources, such as the library. It may be necessary to have controls over access for network users to ensure that use is limited to specific programs. Also, if network users are charged for services, private-interest users may be required to pay higher rates that include all relevant costs, such as overhead.

The network increasingly will be used in educational institutions' daily business, such as for purchasing goods and services. For these types of uses, capacity and security requirements must be anticipated.

In some cases the state educational network may reach remote areas of the state with telecommunications services, such as video, that are not yet available commercially. There should be a policy on whether such services should be made available to private interests.

Questions to ask

- Has the plan anticipated the necessity and the benefits of providing access and other services to private interests and business?
- Does the plan address changes in policies and procedures that providing services to private interests and business would require?

Effects on economic development

The deployment of an advanced educational network in a state can affect economic development significantly. Thus, plans and policies for the educational network should take economic development into consideration.

Advanced educational networks should enhance the strength and performance of colleges and universities. As a result, the community's cultural and economic environments benefit. The colleges' and universities' services are more up-to-date and efficient, and recruitment of faculty and students is enhanced.

The network also enhances a college's or university's ability to offer educational services and programs to locations and in ways that otherwise may not have been practical. For example, specialized courses and learning resources may be accessed via the network, thereby enabling an industry to locate in a remote area and still support professional development and educational opportunities for its employees.

In many cases a high-capacity educational network will "push the envelope" of available telecommunications services in the state. By serving as an "anchor customer," the educational network may enable the state's telecommunications industry to develop its facilities for high-capacity commercial-network services much more rapidly, thus enhancing economic development.

Finally, an advanced statewide network for education enhances the state's image and reputation, benefiting economic development.

Question to ask

- Does the network plan anticipate possible positive effects on economic development in the state, and does it reflect steps to garner support for those purposes?

Growth of network use

Internet traffic is growing exponentially. Observers and analysts seem to agree that this very rapid growth will continue into the foreseeable future. This will apply to statewide educational networks as well. Growth in multimedia instruction will cause increases in traffic load and bandwidth requirements. Instruction also will require the quality features — such as guaranteed access time and availability — promised by the developing Internet2, the next generation of the Internet. Educational networks' management, structure and funding mechanisms need to be prepared to handle rapid growth in traffic and changes in technology.

Question to ask

- Does the plan prepare for the Internet2 and its effects on educational services and bandwidth and technology requirements?

Summary

Education agencies should play a leading role in an open, participatory planning process that involves all telecommunications technologies. There should be an ongoing process for managing and renewing the network. Plans should address not only technology implementation but also user issues such as training, staff support, and incentives for use. The network organization should facilitate the management of the network as a "core" educational resource. The plans also should address interaction with the private sector, including the provision of certain services to private business and the network's general impact on economic development.

Funding should be a special consideration. Although initial funding often must be one-time and ad hoc, ongoing funding should cover all aspects of operating the network, including training and support. Important decisions must be made regarding charges for services vs. central budget allocations. Special pricing for education should be considered.

Economy of scale should be weighed against complexity of management, the need for differentiated services, etc.

Rapid growth in network use and changes in technology will be significant challenges in managing the network and should be anticipated in the plans.

An informed treatment of these issues is critical to the success of a statewide educational network.

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